

First record of *Sphyrna zygaena* (Chondrichthyes: Sphyrnidae) from Angola

by

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RÉSUMÉ. - Premier signalement de *Sphyrna zygaena* (Chondrichthyes: Sphyrnidae) en Angola.

Quatre spécimens juvéniles de requin-marteau commun, *Sphyrna zygaena*, ont été capturés au cours de prospections dans les eaux angolaises par le R/V *Dr. Fridtjof Nansen* en août 2003. Cette capture montre une extension de la distribution de l'espèce aux côtes sud-ouest africaines.

Key words. - Sphyrnidae - *Sphyrna zygaena* - ASE - West Africa - Angola - First record.

The smooth hammerhead shark *Sphyrna zygaena* is a common species in many temperate and tropical seas. In the eastern Atlantic, it is found from the Mediterranean Sea and British Isles to Senegal, Cape Verde Islands, Guinea and Ivory Coast (Devadoss and Natarajan, 1977; Fischer *et al.*, 1981; Compagno, 1984; Compagno *et al.*, 1989). In the area, it occurs together with *Sphyrna lewini* (from Morocco to Senegal and Zaire, and in the Mediterranean Sea) and *Sphyrna mokarran* (off Morocco, Senegal, possibly Canary Islands, Gambia, Guinea and Ghana).

The species is distributed from the surface to at least 90 m depth (Devadoss and Natarajan, 1977; Compagno, 1984). Juveniles are found in coastal areas in shallow waters, while adults are partly oceanic (Fischer *et al.*, 1981; Muñoz-Chápuli, 1984; Compagno *et al.*, 1989). It attains a maximum size of 370 to 400 cm. *S. zygaena* is distinguishable from the others Sphyrnidae by the lack of a median indentation on the anterior margin of the head, a strong prenasal groove in the nostrils, and because the free rear tip of the second dorsal fin does not reach the upper caudal fin origin. All of our specimens fulfilled these requirements.

The captured sharks were brownish coloured dorsally (dark grey-brown) and grey white belly when fresh. All fins were dark-tipped. It has been described to feed on bony fish, elasmobranchs and squids (Fischer *et al.*, 1981; Compagno, 1984; Smale, 1991; Smale and Cliff, 1998).

We give morphometric measurements for four specimens of *S. zygaena* that constitute the first records of the species for the Angolan waters.

MATERIAL AND METHODS

Four hammerhead sharks were collected by bottom trawl during the survey of the "Fish Resources of Angola: Pelagic Resources" on the R/V *Dr. Fridtjof Nansen* along the southern coast of Angola in August 2003 (Fig. 1). Specimens No 1 to 3 are 101, 82 and 79 cm TL, respectively; from station No 3251 (10 Aug. 2003), 14:01-14:31 UTC, 14°13'S, 12°19'E, 31 m depth. Specimen No 4 is 70 cm TL; from station No 3260 (12 Aug. 2003), 10:51-11:09 UTC, 15°37'S, 11°57'E, 72 m depth.

Morphometric measurements were taken in order to identify

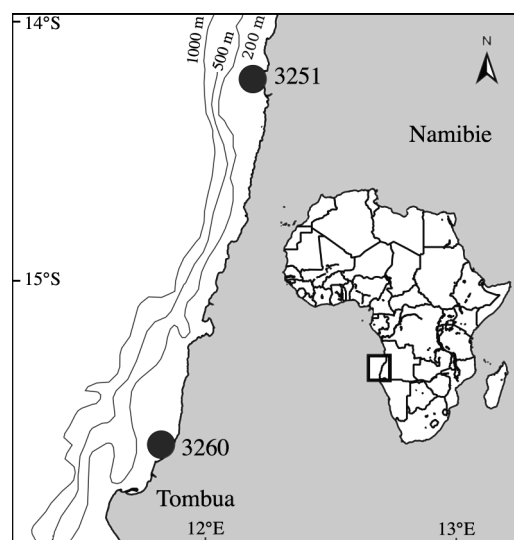


Figure 1. - Stations where four *Sphyrna zygaena* were found in Angolan waters. [Lieux de capture des quatre *Sphyrna zygaena* dans les eaux angolaises.]

the species. Two heads were kept for proper dentition counts. Determination of stomach contents and presence of parasites were made macroscopically. The preys were identified to the lowest taxa possible.

A Seabird 911 + CTD probe was used to measure temperature, salinity and oxygen conditions along vertical profiles.

RESULTS AND DISCUSSION

Four immature males of *Sphyrna zygaena* were collected in August 2003 by bottom trawl in Angolan coastal waters (Fig. 1). Other specimens (five of them, J.P. Roux, pers. com.) were observed from the vessel for the same period and area, and we suppose they belonged to the same species.

Records from Angola give the species a continuous distribution along the south-western coast of Africa.

Morpho-anatomy and measurements of the specimens lead us to identify them as *Sphyrna zygaena* (Tab. I). We used one specimen (101 cm TL) to compare it with the diagnostic features for the species presented by Fischer *et al.* (1981) and Compagno (1984): (1) The head width is 26.5% of the total length. (2) The preoral snout is one-fifth of the head width. (3) The posterior margins of head are wide and generally broader than mouth width. (4) The distance from the tip of snout to the rear insertions of the posterior margins of expanded blades is less than half of head width. (5) The horizontal

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Table I. - Morphometric data expressed as percentage of total length (TL) of the four *Sphyrna zygaena*. [Données morphométriques, exprimées en pourcentage de la longueur totale (TL), des quatre *Sphyrna zygaena*.]

	Specimens				Mean ± SD
	No. 1	No. 2	No. 3	No. 4	
TL (mm)	1010	820	790	700	
Head height	10.6	11.3	10.0	9.6	10.4 ± 0.8
Head width	26.5	-	-	-	-
Prenarial length	9.7	9.6	10.8	11.1	10.3 ± 0.8
Preoral length	5.5	6.0	5.9	5.9	5.8 ± 0.2
Eye diameter	1.9	2.1	2.0	2.3	2.1 ± 0.2
Mouth length	5.0	5.4	5.1	6.1	5.4 ± 0.5
Internarial space	19.8	18.5	19.4	20.4	19.5 ± 0.8
5 th gill slit height (shortest)	2.7	2.4	2.4	3.0	2.7 ± 0.3
1 st dorsal anterior margin	14.6	13.8	12.7	13.9	13.7 ± 0.8
1 st dorsal posterior margin	3.2	3.2	3.9	2.4	3.2 ± 0.6
2 nd dorsal anterior margin	4.6	4.5	4.1	4.6	4.5 ± 0.2
2 nd dorsal posterior margin	4.8	5.0	4.6	4.9	4.8 ± 0.2
Pectoral anterior margin	12.0	11.5	11.4	11.3	11.5 ± 0.3
1 st predorsal length	24.8	20.7	24.0	24.3	23.5 ± 1.8
2 nd predorsal length	58.4	56.1	57.0	55.7	56.8 ± 1.2
Precaudal length	68.3	67.1	67.1	67.1	67.4 ± 0.6
Prepectoral length	18.8	19.5	20.3	21.4	20.0 ± 1.1
Prepelvic length	44.6	43.9	45.6	44.3	44.6 ± 0.7
Preanal length	56.4	57.3	57.0	54.3	56.2 ± 1.4
Clasper inner length	4.3	4.4	4.6	4.3	4.4 ± 0.1
Clasper outer length	2.3	2.0	2.2	2.0	2.1 ± 0.1
Total weight (g)	4100	2300	1950	1350	-
Weight eviscerated (g)	3500	1950	1550	1100	-

eye diameter is larger than the 5th gill slit height. All traits, except the last one, matched the diagnostic features of *S. zygaena*.

Previously, and not reported, three specimens of smooth hammerhead were caught with the R/V *Dr. F. Nansen* in Angolan waters: 16.09.95 at 14°03'S-12°17'E; 15.08.99 at 11°08'S-13°37'E; 14.03.00 at 16°02'S-11°43'E.

Compagno (1984) reports the depth range as from the surface down to at least 20 m, and probably much more, while Devadoss and Natarajan (1977) caught a mature female at a depth of 80-90 m. Ours specimens were found in a bottom trawl haul where the average fishing depth was 72 m, confirming a deeper distribution of the species.

The water conditions were characteristic for the winter season (with an average temperature of 16.5°C, 35.6 psu salinity and 1.7 ml/l dissolved oxygen) when the seawater is generally cooler than during the summer (Ostrowski, pers. com.). Surface temperature taken at 5 m was 21°C. We found the smooth hammerhead sharks in the subtropical transformation zone: the transition zone between the well stratified waters and geotropic circulation in the tropics to the north and the well-mixed waters, and wind driven circulation in the south (Ostrowski, pers. com.).

We examined macroscopically the abdominal cavity, the roof and floor of the mouth, and the gill filaments for parasites. The four specimens were found free of parasites. The liver weight is 2.9 to 4.7% of the total body weight. The four specimens caught were immature males. Size at maturation has been reported to range from 210 to 240 cm (Fischer *et al.*, 1981; Compagno, 1984) and it has been reported that medium sized individuals as well as juveniles are confined to coastal waters (Fischer *et al.*, 1981; Muñoz-Chápuli, 1984; Compagno *et al.*, 1989). These two facts coincide with our observations.

The teeth were small, triangular shaped, deeply notched posteriorly, and smooth edged, which is characteristic for juveniles (Compagno, 1984). The count was: $\frac{15+15}{13+13}$

There was no median separation.

All specimens had full stomachs. The stomachs contained mostly digested remains of fish, of which the only identifiable species was *Brachydeuterus auritus*; otherwise we found hard parts (teleosts skeletal remains) as vertebrae, scales, otoliths and crystallines. One stomach contained beaks from cephalopods, probably belonging to loliginids. These findings coincide with previous data (Fischer *et al.*, 1981; Compagno, 1984; Compagno *et al.*, 1989; Smale, 1991; Smale and Cliff, 1998). The bigeye grunt, *B. auritus*, remains near the bottom during the day and moves up the open water at night (Froese and Pauly, 2000). These findings lead us to think that *S. zygaena* may use this area as a feeding ground and support the thesis that hammerhead shark species meet together when feeding as a group, and that medium-sized individuals as well as juveniles are confined to coastal waters, while larger specimens are primarily oceanic, although they often approach the coast in search of food (Fischer *et al.*, 1981).

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REFERENCES

- COMPAGNO L.J.V., EBERT D.A. & M.J. SMALE, 1989. - Guide to the Sharks and Rays of southern Africa. 160 p. Cape Town: Struik Publishers.
- COMPAGNO L.J.V., 1984. - FAO species catalogue Vol. 4. Sharks of the world. An annotated and illustrated catalogue of shark species known to date. Part 2. Carcharhiniformes. *FAO Fish. Synop.*, 125(4): 251-655.
- DEVADOSS P. & R. NATARAJAN, 1977. - On a smooth hammerhead shark, *Sphyrna zygaena* (Linnaeus, 1758) new to Indian waters. *Curr. Sci.*, 46(5): 166-167.
- FISCHER W., BIANCHI G. & W.B. SCOTT (eds.), 1981. - FAO Species Identification Sheets for Fishery Purposes. Eastern central Atlantic; Fishing Areas 34, 47 (in part). Canada Funds-in-Trust. Ottawa, Dept. of Fisheries and Oceans Canada by arrangement with the Food and Agriculture Organization of the United Nations, Vols IV-V: pag. var.
- FROESE R. & D. PAULY (eds.), 2000. - FishBase 2000: Concepts, Design and Data Sources. 334 p. Los Baños, Laguna, Philippines: ICLARM.
- MUÑOZ-CHÁPULI R., 1984. - Éthologie de la reproduction chez quelques requins de l'Atlantique nord-est. *Cybiu*, 8(3): 1-14.
- SMALE M.J., 1991. - Occurrence and feeding of 3 shark species, *Carcharhinus brachyurus*, *C. obscurus* and *Sphyrna zygaena*, on the eastern Cape coast of South Africa. *S. Afr. J. Mar. Sci.*, 11: 31-42.
- SMALE M.J. & G. CLIFF, 1998. - Cephalopods in the diets of four shark species (*Galeocerdo cuvier*, *Sphyrna lewini*, *S. zygaena* and *S. mokarran*) from KwaZulu-Natal, South Africa. *S. Afr. J. Mar. Sci.*, 20: 241-253.

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